Advanced Meter Infrastructure (AMI) Project Close Out Report

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Prepared by:	Michael Loken Water/Wasterwater Treatment & Compliance
Recommended by:	General Manager of Growth and Infrastructure

Report Summary

This report and presentation provides information regarding the Automated Meter Infrastructure (AMI) project including final project costs, installation completion rate, and final compliance tasks required.

Relationship to the Strategic Plan, Health Impact Assessment and Community Energy & Emissions Plan (CEEP)

The Automated Meter Infrastructure (AMI) Project addresses several objectives within the strategic plan, including:

- *1.2 "Establish Sustainable Asset Service Levels"* through increasing the accuracy and frequency of water billing to help rate payers effectively manage their water consumption and resulting costs.
- *1.5 "Demonstrate Innovation and Cost-Effective Service Delivery"* by maximizing the benefits of technology in the City's service delivery processes, in accordance with the City's IT Strategy.
- *4.4 "Invest in Transformative Facilities, Space and Infrastructure Initiatives"* by replacing aging water meters with industry leading technology.

AMI also supports climate change initiatives by improving the quality of water consumption data which supports effective plant utilization, facility planning and long-term asset plans. These actions support Goal 5 of CEEP to *"decrease energy use in the potable water treatment and distribution system"*.

Financial Implications

The approved contract budget for the AMI project was $17.189 M (inclusive of non-refundable HST) per Council Resolution 2019-207. This amount was subsequently increased by $500,000 in July 2021 to account for unforeseen expenses due to the COVID-19 outbreak for a total installation budget of $17.689 M. The actuals to date and projected costs to complete the project are $17.675 M. A breakdown of the budget and actuals are contained in the body of this report.

Including pre installation consultant costs and a repair contract for curb stop valves that was required to complete some installations, there will be a surplus in the overall approved AMI budget that will be returned to the Water and Wastewater Capital Financing Reserve Funds. These details will be reflected in a future Capital Status Update Report.

The original business case identified net operational savings and efficiencies of $684,000 from the project. Approximately $462,500 will be realized in 2024 and reflected in the 2025 and 2026 operating budgets. The remaining net savings and efficiencies are anticipated to be phased in over the 2025-2027 timeframe.

Background

Project History

Council approved the implementation of a City-wide Advanced Metering Infrastructure System (AMI) in June 2019 with the scope to:

1. Install smart water meters at all residential and ICI (Industrial, Commercial, and Institutional) accounts, along with sufficient radio transmitters to collect & transmit data on a near real-time basis.
2. Implement appropriate hardware and software solutions to allow for review of production and consumption data by both customers and CGS staff.
3. Perform significant asset renewal through the replacement of aging water meters to increase accuracy of measurements used for billing, reduce inefficiencies, and enhance customer service.

The project identified several key improvements, including:

- Enhancing customer service through:
    - Eliminating estimated water bills, performing billing only on metered data.
    - Introducing a monthly billing cycle based on actual measurements.
    - Implementing a customer portal allowing users to view their consumption in real time and better understand and manage their water consumption decisions.
    - Providing proactive notification of frozen water service issues through automated alarming.
    - Allowing customers to create customized high-water consumption and leak detection alerts.
    - Streamlining move-in/move-out process for customers changing addresses.
- Creating operational efficiencies and savings by:
    - Eliminating manual water meter readings.
    - Increasing water meter reliability and reducing meter reading exceptions.
    - Expediting special water meter read requests and providing same day final meter reads.
    - Minimizing high / low meter read field visits.
    - Assisting in detection of backflow events to safeguard our drinking water distribution system.
- Improving accuracy and completeness by:
    - Automatically detecting meter damage and tampering along with notifications of meters reporting consumption.
    - Increasing meter accuracy and meter reading reliability.
    - Improving financial reporting.
- Strengthening distribution system management by:
    - Increasing understanding and accountability for water loss across CGS distribution systems.
    - Utilizing AMI and district metering data to identify operational improvements and provide information to the Water/Wastewater Master Plan.
    - Improving system wide financial reporting.
- Creating societal benefits by:
    - Reducing energy consumption in treatment processes by reducing lost water.
    - Supporting water conservation initiatives.

The project consisted of three major contracts, which were awarded as follows:

- ISD19-18: Water Meter & Encoder Supply & Delivery – Neptune Technology Group
- ISD19-02: AMI Technology Installation and Deployment – KTI Utility Services (KUS)
- ISD19-03: Project Management Services for AMI – Diameter Services

Contract Budget

The approved contract budget, along with current project costs are show below:

Contract or Item	Spending		% Spent
	Planned	Actual/Projected	
ISD19-18: Water Meter & Encoder Supply & Delivery	$ 4,489,822.00	$ 4,308,582.00	95.96 %
ISD19-02: AMI Technology Installation and Deployment	$ 10,383,509.00	$ 11,328,837.35	109.10 %
ISD19-03: Project Management Services for AMI	$ 1,176,222.30	$ 1,615,406.00	137.34 %
Contingency	$ 1,639,968.18	$ 422,944.34	25.79 %
Totals	**$ 17,689,521.48**	**$ 17,675,819.69**	**99.92 %**

The project contingency includes an additional $153,000 for internal resources in 2024 and 2025 to continue the compliance program and complete outstanding meter installations.

Estimated annual operating savings are $684,000, which will be achieved after several years of operation. The full estimate, along with projected savings for 2024 are as follows:

Description	Estimated Savings	
	Full Operation	2024
Elimination of meter reading costs	$ 360,000	$ 268,000
Meter maintenance efficiencies	$ 40,000	$ 0
Efficiencies in customer service and billing	$ 182,000	$ 182,500
Reduction of Non-Revenue Water	$ 428,000	$ 311,000
Additional annual costs (data analyst, customer portal, radio license, etc.)	- $ 326,000	- $ 299,000
Annual Net Benefit:	**$684,000**	**$ 462,500**

Project Schedule and Completion Rate

The initial project schedule set in 2020 did not anticipate the complexities that would result from the COVID-19 pandemic starting in early 2021. During the initial stages of the pandemic response, the project team followed advice and directives issued by Public Health Sudbury & Districts (PHSD), cancelling all in-home installations for the following periods:

- January 14th to February 16th, 2021.
- March 15th to June 6th, 2021.

The impact of these shutdowns was a 16-week delay. However, the pandemic caused a much larger effect as it extended through 2022 and 2023, including reduced labour availability and changing perceptions of the project. Throughout this period, KUS experienced historically high absenteeism (approximately 40%) and staff turnover (approximately one installer every two weeks) leading to low weekly installation rates. Delivery of the required radio transmitters also experienced delays due to microchip availability and global supply chain issues.

In addition to the labour and supply chain challenges, customer feedback when booking appointments showed increased questions concerning the AMI radio technology and an increased reluctance to allow in-home installations. To address these issues the project team, KUS call centre and KUS installers provided additional information regarding COVID-19 safety protocols, equipment specifications, and Health Canada information. In a vast majority of cases, the additional care and information provided through all stages of the booking and installation process resolved the concerns raised by the customers.

Thanks to the dedicated efforts of CGS staff, KTI Utility Services, and Diameter Services the status of meter installations at project completion is as follows:

Description	Number of Accounts	Percentage of Accounts
Completed Meter Installations	47,195	98.5%
Non-Compliant Accounts	652	1.4%
Installations pending service repairs (CGS)	50	0.1%
Total Work Orders	**47,897**	**100.0%**

Comparison to other AMI projects executed within the province shows this to be a high completion rate, as shown below:

Municipality	Project Completion Rate	Notes
A	97.3%	Project impacted by COVID-19 Pandemic
B	97.5%	Project impacted by COVID-19 Pandemic
C	98.2%	Project impacted by COVID-19 Pandemic
D	98.8%	Completed before the COVID-19 Pandemic
City of Greater Sudbury	**98.5%**	**Project impacted by COVID-19 Pandemic**

Figure 1 shows the complete project schedule, including the original and revised timelines presented to Council:

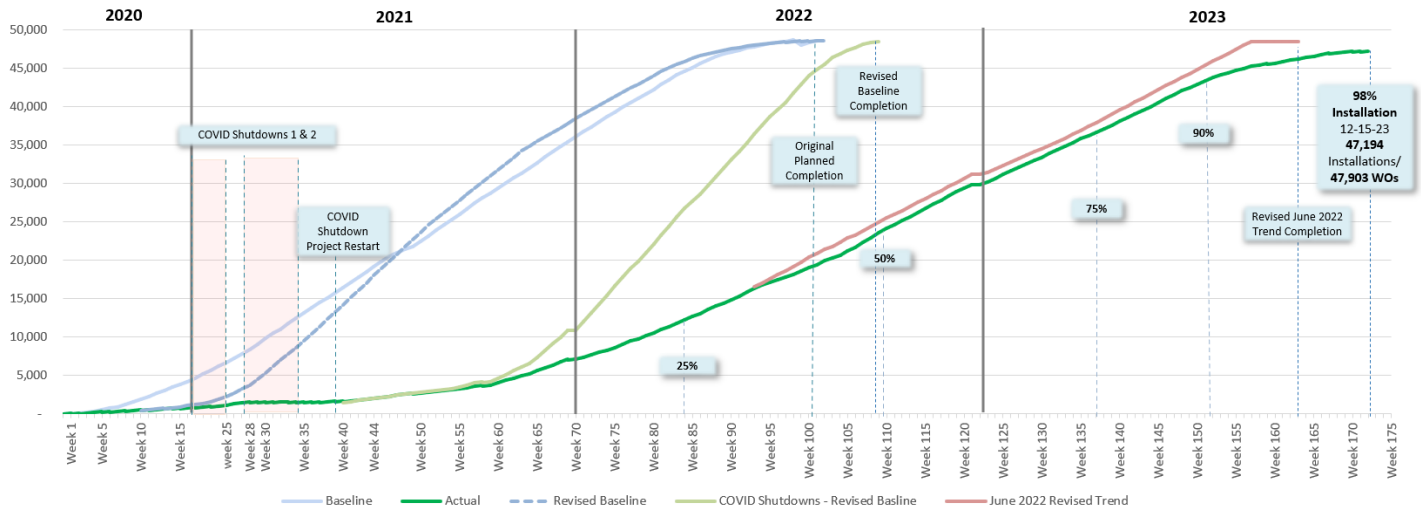

Figure 1: AMI Project Schedule

Meter Communications

The project contract indicated that all installations must achieve successful transmission of 98.5% of hourly readings and 96% of daily meter readings over a 30-day period.

Ana analysis of available data shows that the AMI system is collecting data from all wards at a success rate of over 99%, exceeding design targets.

Water/Wastewater Billing and Customer Portal

Several key project goals are tied to improvements in water billing services and the implementation of an online portal where customers could monitor their own water use. In 2022 Council approved new service contracts with Greater Sudbury Utilities (GSU) to include the AMI system. These contracts included new provisions covering:

- Billing 98% of customers within three (3) business days of the end of a billing period based on actual smart meter readings.
- Providing customer service in line with Council approved customer service standards.
- Operating and maintaining a comprehensive online customer portal.
- Utilizing existing GSU radio spectrum licenses to transmit water meter data.
- Operating and maintaining the radio towers and associated equipment required by the AMI system.

An analysis of the contract cost in 2022, with anonymized data provided by Diameter Services, showed that GSU remained a low-cost service provider even with the increased service provisions in the contracts:

Billing Utility	No. of Accounts	Annual Cost per Account	Reference Year
Utility 1	37,500	$ 59.41	2019
Utility 2	7,000	$ 54.28	2021
Utility 3	8,000	$ 41.68	2021
Utility 4	44,000	$ 36.92	2021
Utility 5	152,000	$ 33.33	2019
Greater Sudbury Utilities	**48,400**	**$ 30.83**	**2022**

The customer portal for water billing was implemented in January 2023 using SilverBlaze software. This is the same provider used by GSU for their electricity data customer portal, providing the use of a single log on for users to access both their water and electricity consumption.

City staff meet with representatives from GSU quarterly to identify improvements to the portal, resolve any outstanding issues and ensure reliable operation for our customers. Currently users can:

- Access hourly and daily water consumption data.
- Set personalized alarms to detect potential water leaks.
- See predicted consumption for the current billing period.
- Access current and historical billing information.

Examples of daily and hourly consumption data, along with the option for water leak detection alarms are shown in Figure 2, Figure 3 and Figure 4.

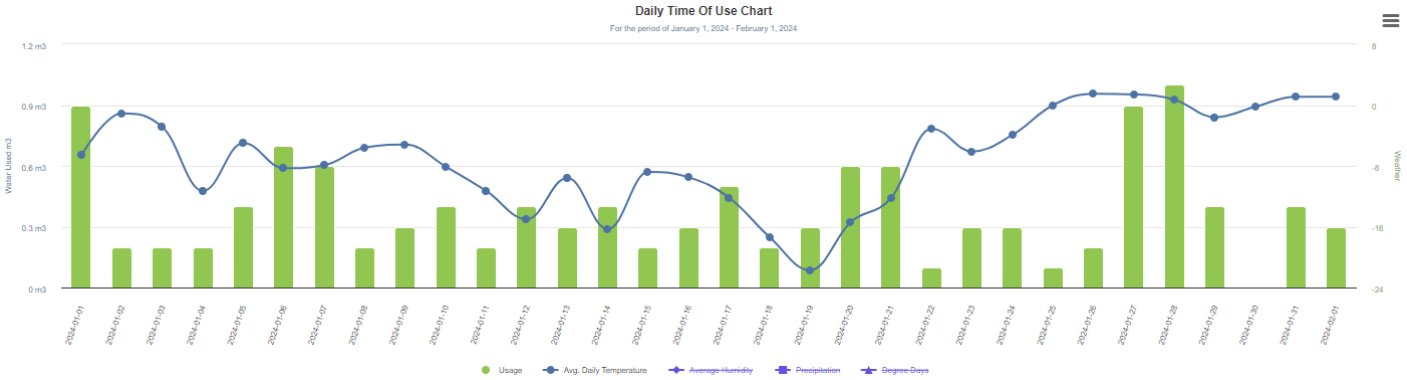

Figure 2: Example Daily Water Use Data

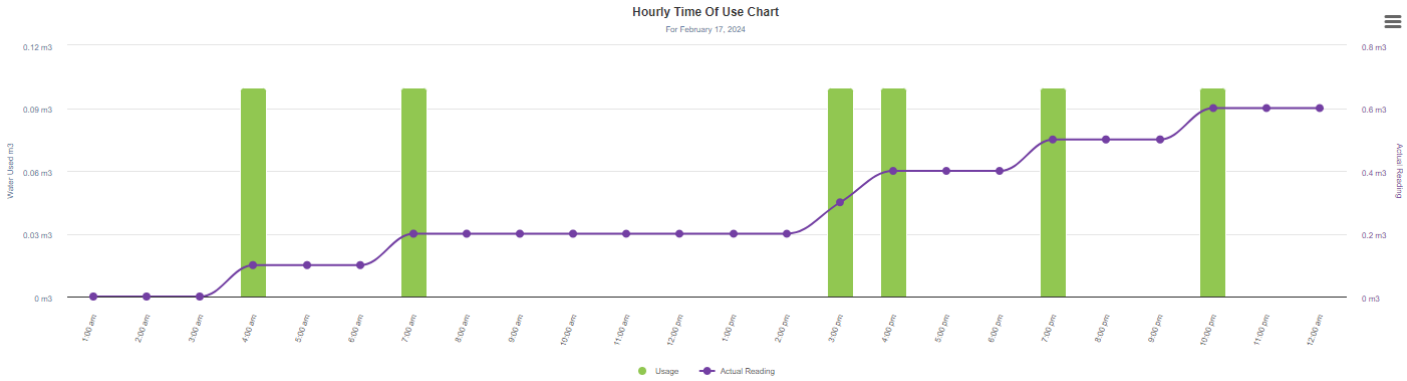

Figure 3: Example Hourly Water Use Data

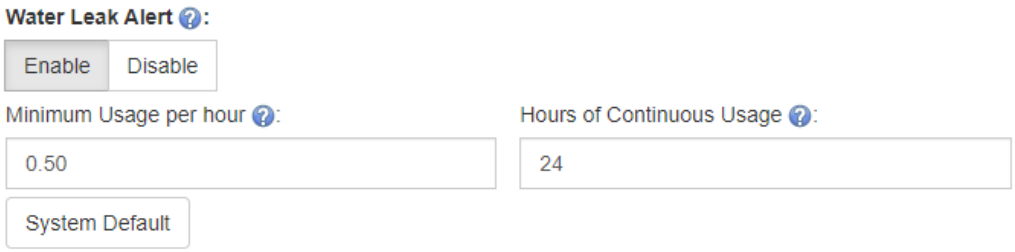

Figure 4: Water Leak Detection

Project Communication and Compliance Program

To achieve the outcomes approved by Council in 2019, the project team required detailed communications and compliance programs to encourage customers to schedule a meter replacement.

The communications plan consisted of the following steps, completed over an average of a 6-month period for each customer:

1) An initial booklet with information on the project, including instructions on how to book an appointment and details for a virtual open house.
2) A reminder letter to change their meter.
3) Phone calls from the KUS call centre to arrange for an appointment.
4) Canvasing and/or a “door knocker” information hanger from KUS as a reminder to book an appointment.
5) A final notice informing the customer of the requirement to book an appointment as well as outlining upcoming steps if their account remained in non-compliance.

A vast majority of accounts successfully booked appointments during this communications phase and required no further actions. Non-compliant accounts also received the following communications:

6) A registered letter providing information on a manual meter read fee, which is an additional charge added to accounts without an AMI meter.
7) Another phone call from the KUS call centre as a final attempt to book the appointment.
8) A registered “final notice” letter informing the customer their water service will be disconnected by the City if a meter upgrade is not completed.
9) A “door hanger” providing a date/time for the water service disconnect.

The manual meter read fee, added to offset the additional costs incurred to send meter readers into specific areas for small numbers of accounts, was initially set at $50/month and generated approximately 50% compliance to book a meter installation.

Data from other municipalities had confirmed that water service disconnects were necessary to achieve project completion and drive final compliance. Approximately 80% of non-compliant accounts scheduled meter installations once the disconnect process started. Meter Shop staff completed sixty-three disconnects until November 8th to avoid any complications with winter conditions, resulting in 90% compliance from the affected accounts. The six accounts that remain disconnected are associated with vacant homes.

Next Steps

As a result of the success achieved by the compliance program, disconnects will resume in 2024 as follows:

- A revised mail out containing all necessary information to book an appointment will be sent to all non-complaint customers starting in April 2024.
- Two seasonal meter installers will be hired for 2024 at a cost of $101,190 and one seasonal meter installer in 2025 at a cost of $52,108 to supplement full time staff.
- "Door hanger" notices will be distributed on a ward-by-ward basis starting in May 2024.
- 100-125 installations will be targeted per month. Certified plumbers will complete installations requiring complex piping alterations or repairs under existing CGS standing offers.
- Disconnects will be completed as required to complete installations.

As the contract with KUS is complete, City staff will perform all future work.

If staff achieve the targeted installation rate, approximately 580 accounts will be compliant by the end of 2024 (82.6% of total non-compliant accounts). The remaining 122 accounts (17.4%) will then be addressed in 2025.

Beyond the compliance program, staff will use AMI data over the coming years to improve customer service, identify system issues, and provide critical information to the Water/Wastewater Condition Assessment and Analytics (CA&A) group. This group is responsible for coordinating a directing operational programs and capital projects to support the Water/Wastewater Master Plan and Asset Management Plan, and to reduce non-revenue water.

The 2024 work plan for the CA&A group contains several key projects and initiatives, including:

- Implementing a program for District Metered Areas (DMAs) to update water audit data for the City's distribution systems. DMAs will allow staff to calculate the difference between water supplied to an area and the water consumed by customers in that area (measured by AMI).

- Updating capital project planning to address areas with the highest water losses identified through water auditing processes.

- Selecting the best available leak detection technology to pair with AMI/DMA data to fix leaks causing water loss.

- Exploring the possibility to construct "digital twin" water systems where staff use AMI data to model water distribution systems using real time information.

- Identifying opportunities to utilize Power BI, CityWorks, and other enterprise software systems to identify issues with private water services and proactively reach out to customers.

Resources Cited

1. *Implementation of Automated Meter Infrastructure (AMI),"* Report dated June 12th, 2019, Presented to Council June 25th, 2019.
2. *"Automated Water Meter Reading Feasibility Study,"* Report dated April 17th, 2018, Presented to Council April 3rd, 2018.
3. "*Advanced Meter Infrastructure (AMI) Project Update and Service Contract Approval*," Presented to Council July 14th, 2021.
4. *"Advanced Meter Infrastructure (AMI) Update and Approval of Greater Sudbury Utilities Service Agreements,"* Presented to Council March 22nd, 2022.